

Employers Perception on the Quality of Graduates from the School of Biosciences and Biotechnology, Universiti Kebangsaan Malaysia

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Abstract: The employers' perception on the quality was derived from evaluation of the knowledge, skills and generic skills that the graduating class of 2011 possessed after undergoing a 120 credit hours of education and training in the seven different programmes offered at the School of Biosciences and Biotechnology. The evaluation was conducted while the students were undergoing their industrial attachment at various organisations which is a mandatory requirement for graduation. The pool of employers demographic in this study was clustered into 13 groups with the largest number of respondents from Research Institutes/Facilities (38.4%) followed by hospitals (26.7%). The study found that the language proficiency of the students in written and oral Malay and written English language was good with an overall average score of 4.00 on a scale of 5. The survey identified the students' strengths in generic skills in commitment to work, work ethics and time management and punctuality (Likert scores ranging from 4.2-4.6). They received excellent ratings with regards to their interpersonal (team-work, respect of others views, racial tolerance and conflict resolution) and their mastery of IT skills (database analysis, internet search and computer proficiency) with an average score ranging from 4.3 and 4.6, respectively in the descriptive factors analysed. As for the quantitative and research skills of the students; the overall analysis showed that the employers were satisfied with the students ability and exposure in both areas (average score range of 3.6-4.1 for the descriptive factors). The results showed that the weakest link for these students was in the area of quantitative analysis which involved critical thinking (3.6), problem solving (3.7) and statistical analysis (3.6). They however, scored higher (scores ranging from 3.9-4.1) with regards to their ability to plan and conduct research.

Key words: Employability, curricula design, perception studies, racial tolerance, strengths, Malaysia

INTRODUCTION

As in most developing nations that are making roads in the industrial and service sector, Malaysia too in its quest in developing these sectors would need to look into the infrastructure necessary to make this transition and development smooth and successful. One critical ingredient in ensuring the success of any industry is the availability of suitable workforce. These services require skilled labour with recognised qualification from institutions of higher education with suitable training in skills and generic skill sets.

Therefore, it is necessary that the higher education sector is well equipped to generate graduates with the required skill sets to make them market ready and readily employable. The increasing number of institutions of higher learning within the country has also resulted in a negative feedback situation which is the unemployment

amongst graduates. This is largely due to a mismatch between the number of graduates and the requirements as well as the misfit in form of skills of the graduates for the marketplace which has resulted in employers looking at the foreign graduates to fill these positions.

According to statistics from Ministry of Higher Education, the total output of graduates is 168,879 in 2007, 173,183 in 2008 and 202,203 in 2009. There is a steady increase in graduate output and this is proportional to the number of unemployed graduates hitting the market place each year. Work relevant skills and generic skills are dominant factor in determining the employability potential of an individual. Currently, employers' are complaining that lots of graduates do not meet their requirements. Among the weaknesses of graduates are lack of soft skills and not performing well at work place. Graduates now a days are expected to not only excel in academics but to be equipped with soft skills necessary for the work

environment. This study attempts to examine employers' perceptions on graduates' performances in the biological science and biotechnology sector, to determine if the curricula and the skills required by employers are embedded into the system of education and training provided at the School of Biosciences and Biotechnology, Faculty of Science and Technology (FST), Universiti Kebangsaan Malaysia (UKM). This survey was conducted using the Job Matching Theory as the underpinning theory that governs the preparation of graduates for the tasks they are going to perform on their jobs (Holton and Trott Jr., 1996). According to the job matching theory, a mismatch between the required skills and the skills a graduate actually possesses has important consequences for productivity, wages and probability to get a job.

Therefore, the competency level (qualification) required by employers must be equivalent with competency level of the graduates and this should be met by the curricula and training received by the graduates. The match between graduates field of specialisation and the field of specialisation which is required for the job is also relevant. Job match also can be identified by the degree to which graduates are able to utilise the knowledge, skills and attitude to the work context (Barnard *et al.*, 2001).

Therefore, the survey questionnaire was designed taking into account the core component of work skills that are required by the employer such as communication skills, team work, problem solving, initiative and enterprise skills, planning and organizing, self-management, learning skills and technology that contribute productive employee (ACCI, 2002). Additional skills sets were included into the questionnaire taking into account the evolution of the marketplace with its constant demands and new demands on the workforce (DEST, 2002; Le Deist and Winterson, 2005).

The questionnaire was divided into three sections; employer's demographic, preparedness of students in knowledge skills and values and the overall evaluation of the quality of graduates produced by the School of Biosciences and Biotechnology. Results obtained from this survey will be used as a guide by the school to improve the overall curriculum content including teaching methods, honing of skill sets such as communication and research skills and other areas of weaknesses; to ultimately produce ideal graduates for the market in line with the Job Matching Theory. The underlying objectives of this survey are:

- To obtain employers feedback on the suitability of knowledge, skills and virtues possessed by the graduates from the School of Biosciences and Biotechnology, Faculty Science and Technology, UKM

- To identify key strengths and weaknesses of the programmes in order to guide the course of remediation

MATERIALS AND METHODS

The questionnaires were distributed to the employers/heads of unit where the graduating students of 2011 where undergoing their industrial training. Out of 273 questionnaires sent, 83 responses were obtained. The feedback was evaluated based on a Likert rating scale from 1 (poorly prepared) to 5 (well prepared) or 1 (incompetent) to 5 (very competent) for section B and from 1 (highly unlikely) to 5 (very likely) for section C. The data obtained from these 83 respondents were then analysed via the SPSS software Version 18.0 to obtain a precise assessment and the resulting figures were expressed as an average mean value. Statistical analysis of the accumulated data can be utilised by the school to improve the current teaching and learning systems.

Section A: Dealt with the demographics of the employer.

Section B: How prepared are the students in knowledge, skills and values? This component was further divided into seven sub-components which addressed: How well prepared are they in the following: General skills; quantitative skills; interpersonal skills; information technology skills; research skills contribution towards organisation and their preparedness in the various fields of biosciences. There were 37 questions in all covering the above and they were rated on a scale of 5-well prepared to 1-poorly prepared.

Section C: Addressed the overall view of the employer on the quality of graduates from the School of Biosciences and Biotechnology, Faculty of Science and UKM. The questions addressed the strengths and the weaknesses of the graduates based in the employer's perception of candidate during their 3 months stint of practical training.

RESULTS AND DISCUSSION

Section A; employers demographic: As described in the methods section of this study; 273 survey forms were distributed to all the organisations and companies that were providing the mandatory industrial training to the graduating students of 2011 from the seven different programmes within the School of Biosciences and Biotechnology. Out of the 273 survey forms that were distributed only 83 forms (30%) were completed and returned to the school (Fig. 1a).

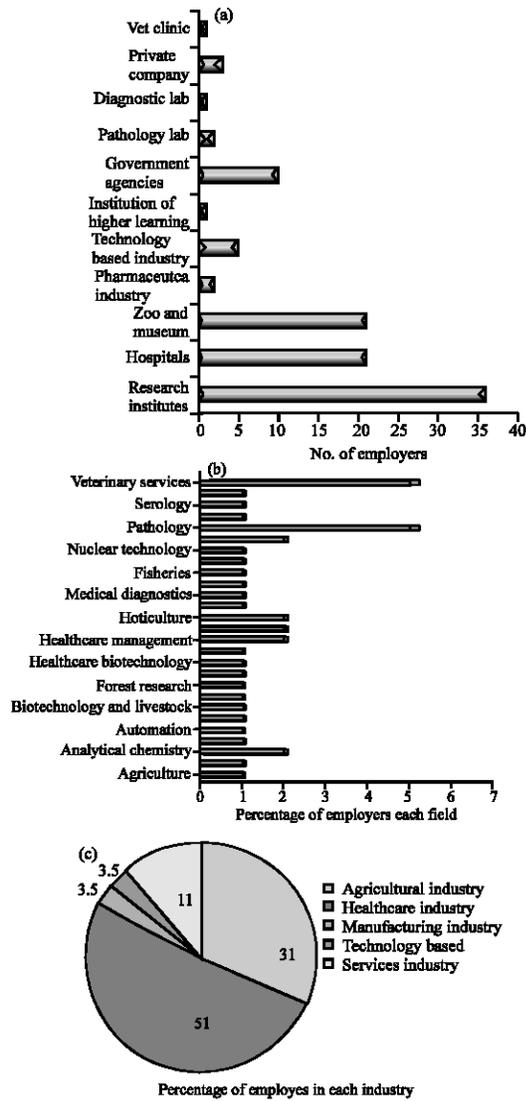


Fig. 1: Employers demographic which identified the frequency of employers by organisation (RIs, IHLs, companies, etc.), distribution by area and breakdown into main industrial sectors in the country; a) Frequency of employers by organisations; b) Percentage of employers by area and c) Percentage by industry

Out of the 83 respondents obtained, 42% (35 respondents) were from research institutions, 30% (25 respondents) were from hospitals, 12% were from government agencies, 6% from technology based industries and the other demographics ranged from 1.2% (1 respondent) to 4.8% (4 respondents). From the 30% representative data obtained from the 273 forms distributed; researchers may conclude that the students from the School of Biosciences and Biotechnology, FST

would be ideal candidates for employment at research based organisations, hospitals, government agencies and technology based industries (Fig. 1b).

This is largely due to the curriculum and training received by the students >3 years which is in research, diagnostics, management and policy making. Their training and exposure in the 3 years and the 120 units of courses, laboratories practical and industrial training provide them with the needed skills to be in these organisations. Further clustering of the organisations into industries resulted in a large percentage (51%) grouped into the health industry which includes hospitals, diagnostic laboratories and research units. This was followed by the agricultural industry (31%), services industry (11%), manufacturing and technology based industry (3.5% for both) (Fig. 1c).

Field of organisation and student distribution: When the organisations were analysed by the field of biosciences and technology that would best describe them, researchers found that the largest number of organisations were from the field of Microbiology (27), Biochemistry (24) and Molecular Biology (21). The lowest numbers of respondents were obtained from the area of Zoology and Plant Biotechnology and Management with 6 and 8 respondents, respectively. This is in line with the number of survey forms obtained by field of study where it was the employers of the Microbiology and Biochemistry Programme students who made a large number (51) of employers whom had submitted completed forms to the school.

While Molecular Biology may not be a programme offered within the school, the field remains a crucial component of the curriculum and research for Biosciences and Biotechnology. Students are exposed to Molecular Biology through courses and laboratory practical's such as Fundamental of Molecular Biology, Gene Expression, Microbial Genetics, DNA Recombinant Techniques Laboratory Practical's and Plant Molecular Biology to name a few.

Employer-employee relations: The survey returned a 54.2% percentage for employers who have known the students for <1 year, 15.7% who know the students for a period between 1-3 years and 26.5% of the students whom have known the students for >5 years (Fig. 2). This we believe is an important factor in determining the strength of the evaluations and comments made. While it is possible to report on the students' performance over a period of 3 months in industrial training, it is however not enough time or insufficient time for the student to acclimatise to the work environment and to make

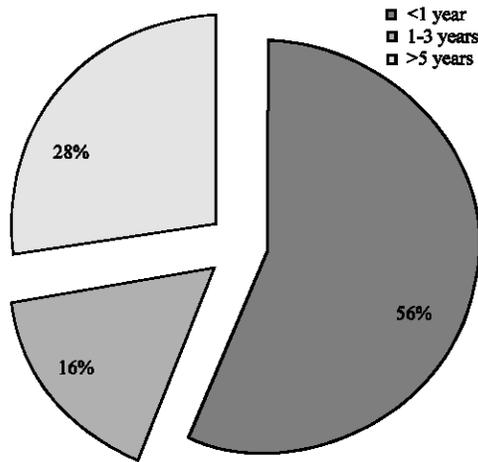


Fig. 2: Period of acquaintance between employer-employee; a) Number of employers and b) Percentage of employers in each field (percentage of employers in each industry)

changes in line with the on job requirement. While we may endeavour to generate job ready graduates, we also need to take into account the human factor and reality within which this operates as no student is ready for the marketplace at day one on the job. This will always involve a period of learning, unlearning and re-learning and if necessary retooling. On closer examination of the feedback obtained, we found that the longer the employer knew the student, the better the overall comments were. This we feel is due to the employee having a longer exposure period to the work environment than the fresh graduates out on industrial training; enabling them to be more proficient in their overall performance on the job.

How would you rate our students’ ability in knowledge, skills and values?

Communication skills: In this study, the students were evaluated for their language competency in both English and Malay language. The competency was measured in oral and written application of both languages by the students. In comparison, the oral communication of the students in English was somewhat competent (mean range of 3.92) as compared to their written which was competent with mean values of 4.25 (Table 1). However, the students were proficient in both written and spoken Malay language where their mean average scores were 4.68 for spoken and 4.65 for written (Table 1). This is to be expected as while the students have gone through Mathematics and Science in English in school; their exposure and opportunity to communicate and utilise English in school remained limited. In the School of Biosciences and Biotechnology, there are certain courses

which are taught in English. Up to 50% of core courses in certain programmes (Biochemistry and Microbiology) have been conducted in English. Although, courses may be given in English, the students revert to using the Malay language outside lecture hours and amongst friends. This therefore does not create a conducive environment for the development of a language.

Researchers need to however consider that while Malay language remains the National language, the lingua franca in the market place and in industries that are non-governmental is in English and thus is a sought after skill by the industry. Internationalisation of the education industry and the establishment of Malaysia as an education hub is largely dependent on an internationally used language as the medium of instruction. This too will open doors and opportunities for us to receive exchange staff from foreign universities in exchange of expertise and skills transfer (IPPTN, 2007).

Generic skills: In addition to the communication skills mentioned above, the students were also evaluated on presentation skills, time management and punctuality, adaptability, work ethics, social responsibility, ability to listen, commitment to work, leadership qualities, self-confidence and self-appearance. Out of the ten skills mentioned above; the employers were satisfied (somewhat prepared; Likert scale >4) with the time management and punctuality, adaptability, work ethics, social responsibility, ability to listen, commitment to work and self-appearance qualities of the students from the School of Biosciences and Biotechnology (with an average mean score of 4.24 for the seven stipulated areas). The outstanding quality of the graduates was seen in their commitment to work where they obtained a mean score of 4.44. The student’s leadership qualities (mean 3.62), presentation skills (mean 3.76) and self-confidence (mean 3.93-borderline to well prepared) were the weaker components of the graduates where the average mean score is 3.77. The overall score for generic skills are 4.00 which is still within the satisfactory category, i.e., somewhat prepared with a score reading of ≥4.00 (Semeijn *et al.*, 2005) (Table 2).

Analytical skills: In line with the ACCI (2002) criteria, the analytical skill qualities of the graduates were evaluated in the areas of data collection and analysis, statistical analytical ability, problem-solving skills and critical thinking. The average mean for all the four skills stated above are 3.57. However from the survey, the data derived showed that the students lacked abilities in statistical analysis and critical thinking, i.e., mean 3.56 and 3.60,

Table 1: Oral and written skills of students in Malay language and English

Communication skills	Very competent	Competent	Somewhat competent	Poorly competent	Incompetent
Oral communication English			3.92*		
Oral communication Malay language		4.69			
Written communication English		4.25			
Written communication Malay language		4.66			

Table 2: Generic skills of final year students from the School of Biosciences and Biotechnology

Skills	5 Well prepared	4 Prepared	3 Satisfactory preparedness	2 Unprepared	1 Poorly prepared
Presentation skills			3.76		
Time management and punctuality		4.27			
Adaptability		4.18			
Work ethics		4.26			
Social responsibility		4.18			
Ability to listen		4.28			
Commitment to work		4.44			
Leadership qualities			3.62		
Self-confidence			3.93*		
Self-appearance		4.07			

Table 3: Analytical skills of final year students from the School of Biosciences and Biotechnology

Skills	5 Well prepared	4 Prepared	3 Satisfactory preparedness	2 Unprepared	1 Poorly prepared
Data collection and analysis			3.90*		
Statistical analysis			3.56		
Problem solving skills			3.68		
Critical thinking			3.60		

*Borderline score approaching the category of well prepared

Table 4: Team-working abilities of final year students from the School of Biosciences and Biotechnology

Skills	5 Well prepared	4 Prepared	3 Satisfactory preparedness	2 Unprepared	1 Poorly prepared
Teamwork		4.29			
Respect of other opinion and views		4.31			
Racial tolerance		4.37			
Conflict resolution		4.10			

respectively (Table 3). The students are exposed to statistical analysis in the Biometry course taken in the 2nd year of studies. They are likely to get some hands-on application of this in their final year project. This therefore would account for the lack of skills in this area. In addition, the structure of questions, work papers, tutorials and quizzes contain the synthesis and analytical component at a low percentage (10%) in year 1 and is gradually increased to 30% in their final year. During the recent evaluation of curriculum during the MQA (Malaysian Quality Assurance) review process; the incorporation of the taxonomic bloom components into the curriculum content of each course and the introduction of problem-based learning into certain course components was felt necessary to build the analytical and critical thinking abilities of the students. As this was only introduced >1 year ago; the graduating class of 2011 were only exposed to the newly improved syllabus of their respective programmes for only a year. Researchers believe that the changes made will have some effect on the exposure and the abilities of the students to conduct situational analysis and synthesis in their work environment when the current batch of 1st year students are evaluated at exit point.

Team working abilities: Being a team player is crucial for healthy work environment and successful work outputs. The team playing abilities were evaluated on the ability of the students to work effectively in a team, respect for team members to practice racial tolerance and the ability to resolve conflict amicably. The average mean value for the evaluated components as in Table 4 is 4.26, i.e., indicating that the students were well acclimatised to team work and this we believe is largely due to laboratory practicals, tutorials, group presentation and community projects that are conducted in small groups with the students. All students evaluated seemed to fall well within the well prepared category (Table 4).

ICT skills: Table 5 shows the basic skill sets in ICT that are required by employers of employees in the industry. The average mean for the three parameters used in this analysis is 4.07 which indicates that the employers were satisfied with the ICT skills of the students. The weakest link among the 3 factors identified as component of ICT skill set for Biosciences and Biotechnology is database analysis with a mean value of 3.87. This again boils down to the level of exposure the students have to this skill which is minimal >3 years of study in the School

Table 5: ICT skills of final year students from the School of Biosciences and Biotechnology

Skills	5 Well prepared	4 Prepared	3 Satisfactory preparedness	2 Unprepared	1 Poorly prepared
Database analysis			3.87		
Internet search		4.16			
Computer proficiency		4.19			

Table 6: Contribution to the organisation of final year students from the School of Biosciences and Biotechnology

Skills	5 Well prepared	4 Prepared	3 Satisfactory preparedness	2 Unprepared	1 Poorly prepared
Creativity and innovation			3.75		
Marketing skills			3.41		
Global orientation			3.53		

Table 7: Research skills and competency of final year students from the School of Biosciences and Biotechnology

Skills	5 Well prepared	4 Prepared	3 Satisfactory preparedness	2 Unprepared	1 Poorly prepared
Competence in research methods			3.74		
Competency in handling laboratory equipment			3.90		
Ability to plan and conduct research			3.72		

of Biosciences and Biotechnology with the only tangible exposure during their final year research project besides a 2 unit course in 2nd year.

Contribution to the organisation: In addressing parameters that may be used to evaluate students contributions to the organisation, the overall mean scores were in the range of 3.53-3.75 (Table 6). While these score were not considered good, they were within the acceptable standards. Researchers however, have to take into account that the students are not given much room to develop this area of their skills as the education structure and co-curricular activities does not however ensure that each individual develops this skill. More often than not a handful of extrovert go-getters are the ones who are in the forefront initiating and mobilising activities which contribute to the organisation. There is limited opportunity for the students to explore their creativity and innovative abilities. In addition, the medium of instruction and the structure of instruction in the university are still more towards the conventional style of education and have not evolved to the current trends and style of education. In the School of Biosciences and Biotechnology, the students do not get instructed in the area of marketing other than the students who are in the Management and Plant Biotechnology programme where their module would include certain courses from the Business School. The remaining six programmes within the school have completely no exposure to marketing or business centred content in their curriculum. We therefore, need to brainstorm ways and means by which we may incorporate marketing, creativity and innovation and the need to be globally orientated into the system of education.

Research skills: The graduates of the School of Biosciences and Biotechnology were evaluated in three

areas; competence in research methods, competence in handling laboratory equipment and the ability to plan and conduct their research. At the undergraduate level students exposure to research methods and planning and execution of research is minimal as they are given a research project in their final year of study.

The scope of work involved in the two semesters they are given to perform this research is limited and is dependent on their practical and theoretical exposure. Table 7 shows the mean values for the three parameters evaluated. Taking the above into account I believe their scores of 3.71-3.90 is in the borderline of satisfactory to good (score >3<4).

Interpersonal skills: Table 8 shows the feedback received on the descriptive statistics for interpersonal skills. On the overall these skills average a 3.93 score which is good score (almost 4). We believe that the environment provided in class, tutorials and laboratory practical's provides the students with sufficient exposure to building interpersonal skills and in dealing with various situations as it would arise within the organisation.

What is your overall evaluation of the School of Biosciences and Biotechnology? The overall response received from the employer showed that in the short time that the graduates were placed under their care that they were satisfied (almost a good rating as scores were close to 4) with the quality of graduates from the School of Biosciences and Biotechnology, Faculty of Science and Technology UKM. We have to bear in mind that in the duration of 3 months; the students will have to acclimatise to environment, fit in with new job description and handle a research project which is all new to them. Therefore, it would not be a fair evaluation to state that the graduates are of satisfactory standards based on just this feedback from employers during industrial training. This research

Table 8: Interpersonal skill of final year students from the School of Biosciences and Biotechnology

Skills	5 Well prepared	4 Prepared	3 Satisfactory preparedness	2 Unprepared	1 Poorly prepared
Networking amongst colleagues			3.83		
Adaptability to work environment		4.01			
Interpersonal skills		4.29			

Table 9: Employer's response on final year students from the School of Biosciences and Biotechnology

Marketability of Bioscience and Biotechnology graduates	5 Very likely	4 Likely	3 Somewhat likely	2 Unlikely	1 Highly unlikely
Recommend program to family and friends			3.85		
Recommend BsBt		4.08			
Provide positive feedback on BsBt		4.07			
Hire UKM graduates			3.88		

has to be repeated with the alumni of the school to obtain a more comprehensive and valid response on the quality of graduates from the School of Biosciences and Biotechnology (Table 9).

CONCLUSION

Empirical studies that related to employers perception on the graduates cover many aspects and demonstrate various findings. Most studies find that the highest rating criteria from the employers' perception study is communication skills which is followed by team work, learning skills and technical skills (Dench *et al.*, 1998). The overall conclusion that may be made from these finding is that the students from the School of Biosciences and Biotechnology have fared well in the eight main components above. They were scored as well prepared in the areas of communication in Malay language, written communication in English, team working abilities, interpersonal skill and ICT skills. They were however somewhat prepared in their performance in oral communication in English, analytical skills, research skills and in their contribution to the organisation. The findings show that the graduates are not found lacking in the areas listed as weaknesses of the Malaysian graduates in the study prepared by the National Higher Education Research Institute, Malaysia (IPPTN). In this report, unemployment among graduates where attributed to lack or weak proficiency in English language, interpersonal and communication skill not proactive unable to work as a team, unwilling to learn from subordinates and narrow minded. Another study by NEAC (2001) stated that the main determinant of graduate's employability is communication skills while academic achievement is rated number eight (Archer and Davison, 2008; Ismail *et al.*, 2011).

The finding of this survey, the immediate intervention plan would be to obtain a feedback from employers of the alumni. Since, the 3 months duration of industrial training is hardly sufficient time for acclimatisation to work environment and for the employer

to know the employee and to be able to provide a more informed feedback on the graduate quality, we believe that the alumni survey will provide a better input into the quality of graduates from the school.

Meanwhile the School of Biosciences and Biotechnology would have to brainstorm innovative means by which they may improve on the weaknesses detected through this survey. Researchers hope that the employer's perception from employers of the alumni and the methods of intervention may be determined before the next MQA revamp in 2013.

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